DETROIT DIESEL
CORPORATION

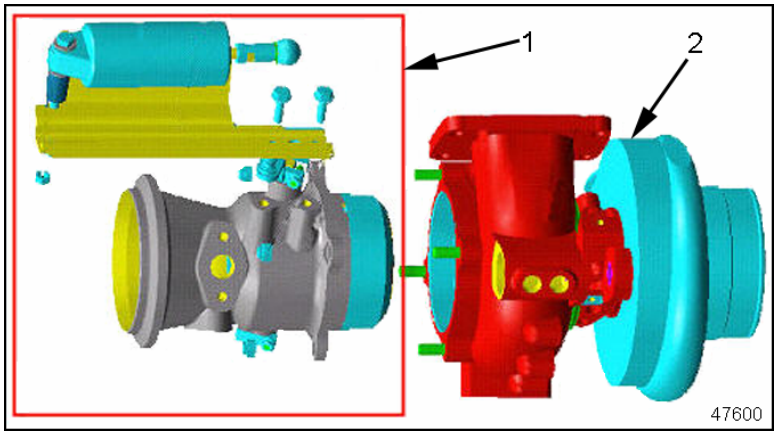
No.: 06 TS - 22
August 17, 2006

TO: Service Locations

FROM: Technical Support

SUBJECT: REMAN MBE 4000 Turbo Brake Assembly

ISSUE
A new service assembly (P/N: R4571401206) is now available to install a REMAN MBE 4000 brake assembly, see Figure 1, No.1. This assembly can be used to address engines with braking performance complaints without replacing the complete turbo brake assembly.



1. Brake Assembly 2. Turbocharger

Figure 1 REMAN Turbo Brake Assembly

Please reference 18SP635 for additional kit information.

NOTE:
Prior to performing a brake assembly repair, all other possible causes for braking performance concerns should be reviewed. Some causes are:

- Sliding Sleeve Pneumatic Actuator
  - Air Supply
  - Internal Damage to Pneumatic Actuator
  - Bent Bracket
  - Linkage Adjustment
- Software Calibration
- Constant Throttle
  - CTV Solenoid
  - Wiring
  - Supply Line

TURBO BRAKE ASSEMBLY REMOVAL PROCEDURE
Remove the turbocharger from the engine as follows:

WARNING:

PERSONAL INJURY

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

1. Apply the parking brake, chock the wheels, and perform any other applicable safety steps.
2. Disconnect vehicle battery power.
3. Remove the exhaust pipe from the turbocharger. Refer to the applicable vehicle service manual.
4. Remove the turbocharger inlet air pipe. Refer to the applicable vehicle service manual.
5. Remove the oil feed and return pipes from the turbocharger. Refer to the *MBE 4000 Service Manual* (6SE412).
6. Disconnect the turbocharger speed sensor harness connector. Refer to the *MBE 4000 Service Manual* (6SE412).
7. Disconnect the turbocharger wastegate and sliding sleeve air lines. Refer to the applicable vehicle service manual.
8. Remove the turbocharger from the exhaust manifold and place the turbocharger on a bench. Refer to the *MBE 4000 Service Manual* (6SE412).

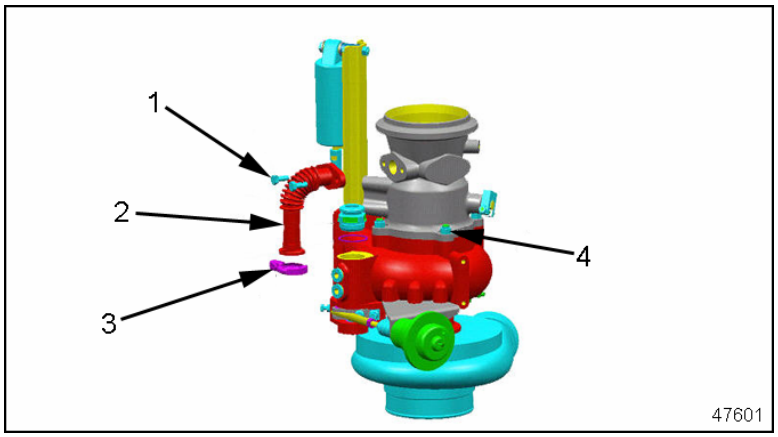
Prior to disassembly of the turbo brake assembly, a routine inspection of the turbocharger should be completed. Areas of concern could include:

- Evidence of foreign objects entering and exiting the turbocharger
- Evidence of restricted air flow
- Evidence of lack of lubrication
- Evidence of turbine or compressor wheel damage

TURBO BRAKE DISASSEMBLY PROCEDURE
Disassemble the turbo brake as follows:

1. Remove the clevis pin from the ball socket on the sliding sleeve actuator and discard.
2. Using a large screw driver or pry bar, disconnect the sliding sleeve actuator ball socket from the sliding sleeve lever.
3. Inspect the sliding sleeve actuator for damage or binding and try to move the sliding sleeve lever. This is used as a general inspection and may pinpoint the area of concern.
4. Remove the two bolts (1) and v-band clamp (3) from the exhaust bypass pipe (2). Discard the two bolts (1), but save pipe and clamp for reinstallation. See Figure 2.

5. Remove the four (4) nuts holding the brake assembly to the housing and discard. See Figure 2.

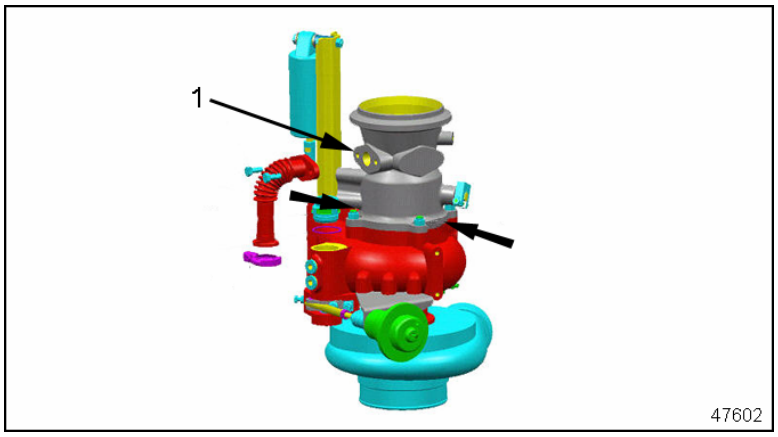


1. Bolt (2 qty.)
2. Exhaust Bypass Pipe
3. V-Band Clamp
4. Nut (4 qty.)

Figure 2 Exhaust Bypass Pipe and Brake Assembly Nuts

6. Separate the assembly from the turbocharger housing. Set the turbocharger horizontally on a sturdy table. Protect the speed sensor and wiring from damage.

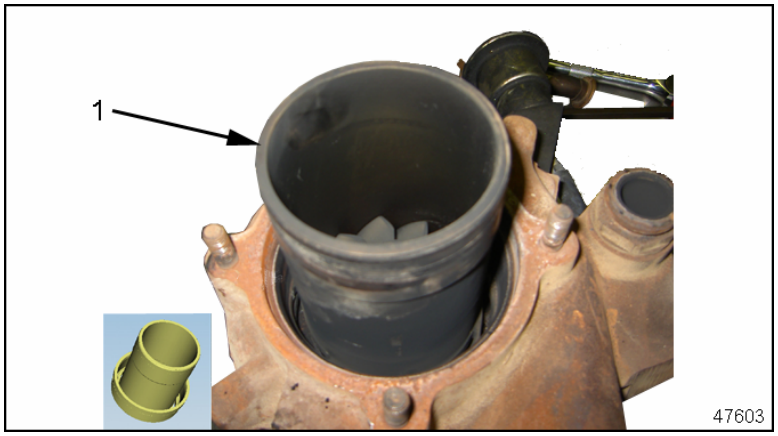
   a) Using a brass hammer, tap the turbocharger housing equally on two sides until a small gap is generated around the mating surface of the brake assembly and turbocharger housing. Do NOT hit the exhaust pipe connecting flange. See Figure 3.
   b) Once a gap is generated, use a large screwdriver or pry bar to apply even leverage 180° apart to separate the brake from the turbocharger housing. See bold arrows in Figure 3. Try to keep the brake assembly as straight as possible when removing.



1. Exhaust Pipe Connecting Flange

Figure 3 Leverage Points

NOTE:
During most disassemblies the matrix usually stays in the turbocharger housing due to tight tolerance, and a slight build up of rust. See Figure 4.

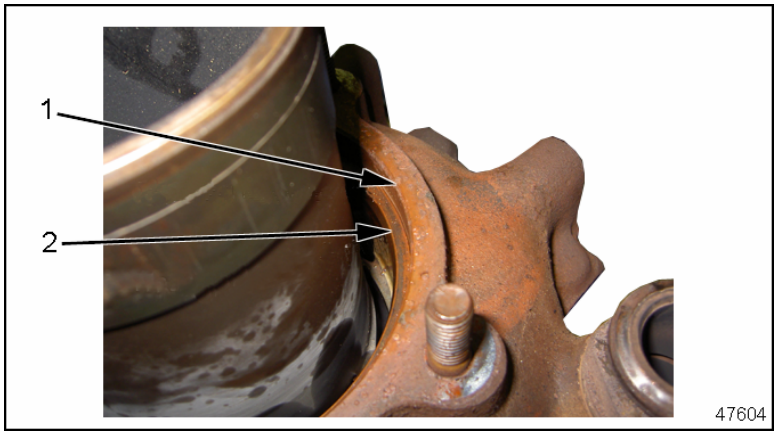


1. Matrix

Figure 4 Matrix Still Inside Housing

7. To remove the Matrix from the turbocharger housing do the following:

   a) Use an emery cloth to clean the edge of the turbocharger housing just above the Matrix lip. Do NOT use a die grinder or a powered sander. See Figure 5.



1. Housing 2. Matrix Lip

Figure 5 Matrix Lip and Housing

   b) Apply a small amount of penetrating oil just above the Matrix lip around the entire radius and allow it to set for a few minutes. The penetrating oil will seep down along the walls allowing the Matrix to be removed without damage. See Figure 6.

Figure 6 Applying Penetrating Oil to Matrix Lip

NOTICE:
If the Matrix will not turn by hand after penetrating oil has been applied, use a non marring strap wrench near the base to provide extra leverage. Do NOT hit the side of the Matrix. A rocking motion can cause damage to the Matrix or the turbine blades. See Figure 7.

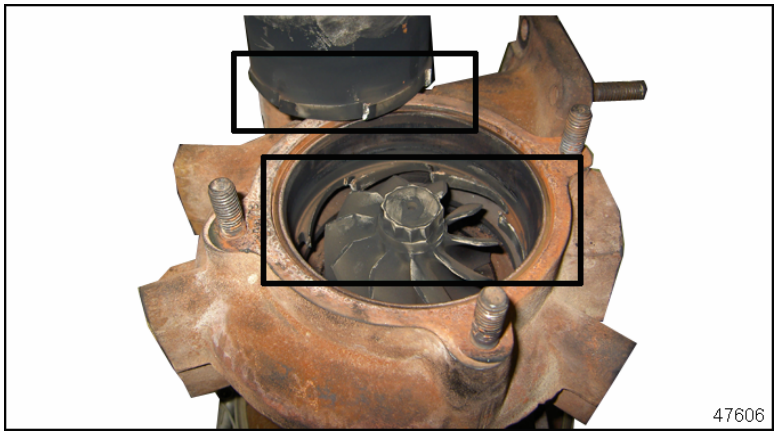


Figure 7 Broken Matrix (separated)

c) Grab the Matrix with two hands and rotate it back and forth while pulling straight up. If the Matrix binds up, lightly tap the TOP with a rubber mallet to re-seat it in the bore. Re-inspect the housing bore for a lip and remove if necessary. Continue the process until the Matrix is removed. See Figure 8.

Figure 8 Matrix Removal

8. Do the following to inspect the turbine blades and housing for wear:

   a) Inspect the turbine blades for wear, cracks, chips, or evidence of foreign material entering the turbocharger. See Figure 9.

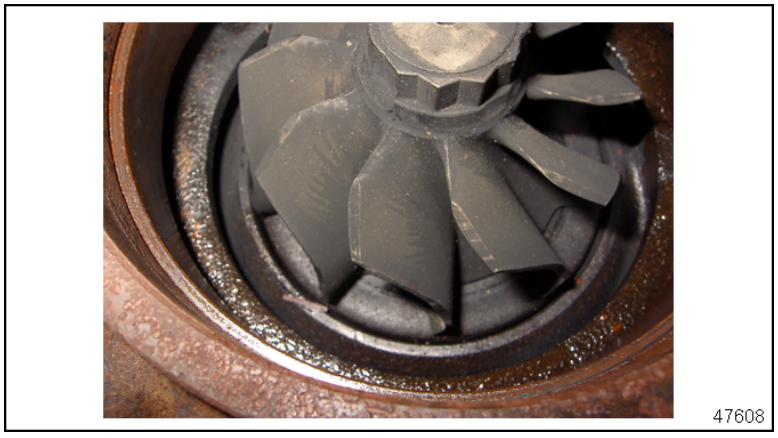


Figure 9 Checking Turbine Blades for wear

   b) Inspect the inside of the housing for single or multiple cracks. The housing can **ONLY** be reused if the cracks do not intersect. See Figure 10.

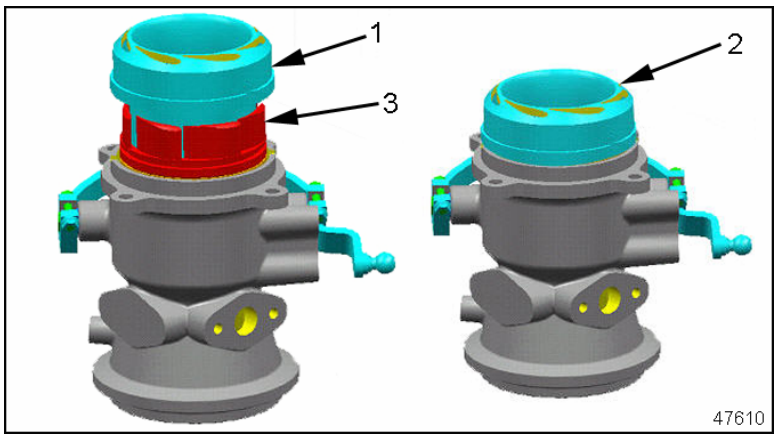
1. Single Crack (No intersecting cracks – reuseable) 2. Multiple Cracks (Intersecting cracks – non- reusable)

Figure 10 Intersecting vs. Non-Intersecting Cracks

9. Use an emery cloth and clean all mating surfaces between the housing and the new brake assembly.

BRAKE ASSEMBLY PROCEDURE
Assemble the brake as follows:

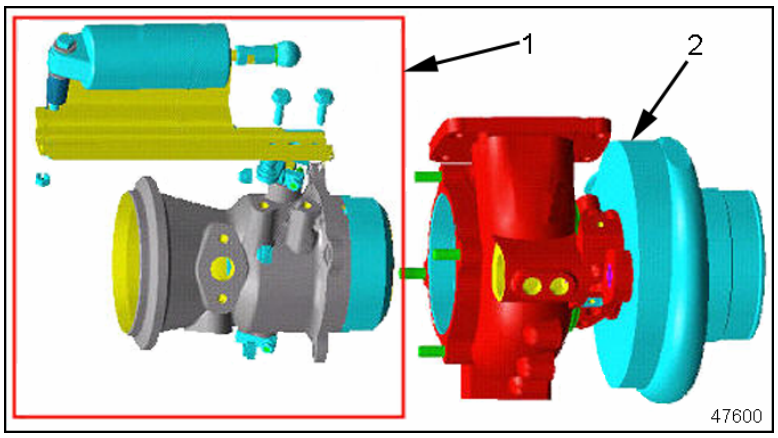
1. Place the brake assembly and turbocharger housing on their sides, see Figure 12.
2. Remove the tie wrap holding the Matrix together with the brake assembly.
3. Ensure the Matrix is seated over the guide baffle. See Figure 11.



1. Non-seated Matrix
2. Seated Matrix
3. Guide Baffle

Figure 11 Non-Seated and Seated Matrix

4. Ensure the brake assembly is parallel to the turbocharger housing and slide the two assemblies together until they are fully seated. See Figure 12.



1. Brake Assembly
2. Turbocharger

Figure 12 Turbo Brake Assembly

NOTICE:
Due to the tight tolerance of the Matrix to the housing, care must be taken not to damage either assembly.

5. Install and torque in a diagonal sequence the four turbo brake assembly nuts to 40 N·m (29 lb-ft).

6. Install the exhaust bypass tube flange to the brake assembly using two M8 X 16 bolts and torque to 30 N·m (22 lb-ft).

7. Install the opposite end of the exhaust bypass tube to the turbocharger housing and torque the v-band clamp bolt to 5-7 N·m (4-5 lb-ft).

8. Connect the turbocharger to the exhaust manifold. Refer to the *MBE 4000 Service Manual* (6SE412).

9. Connect the turbocharger wastegate and sliding sleeve air lines. Refer to the applicable vehicle service manual.

10. Connect the turbocharger speed sensor harness connector.

11. Connect the oil feed and return pipes to the turbocharger. Refer to the *MBE 4000 Service Manual* (6SE412).

12. Connect the turbocharger inlet air pipe. Refer to the *MBE 4000 Service Manual* (6SE412).

13. Connect the exhaust pipe to the turbocharger. Refer to the applicable vehicle service manual.

14. Connect vehicle battery power.

WARNING:

PERSONAL INJURY

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- **Always start and operate an engine in a well ventilated area.**
- **If operating an engine in an enclosed area, vent the exhaust to the outside.**
- **Do not modify or tamper with the exhaust system or emission control system.**

15. Start engine and check for air or oil leaks.

CONTACT INFORMATION

Please contact the DDC Customer Support Center at 313-592-5800 if you have any questions.